

**ABSTRACT OF THE DISCLOSURE**

A method of computing allowable routes through a data network that includes a subnetwork that introduces a subnet intransitivity constraint on allowable paths through the network involves using an abstracted network map to construct a directed graph that compensates for the subset intransitivity constraint by removing all unallowable paths. The abstracted network map may be used to compute least cost allowable paths through the network. The directed graph represents the same network, and is constructed by representing bi-directional links between the subnetwork elements with two directed edges, and representing the subnetwork elements as paired ingress and egress nodes. A method for constructing the directed graph representing an abstracted map of a network that exhibits subset intransitivity is also described.